Nomenclatural Changes and Range Extension in *Leiothrix flavescens* (Bong.) Ruhl. (Eriocaulaceae)

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The Eriocaulaceae comprise about 1,200 species distributed throughout the tropical and subtropical regions of the world (Kral, 1989). The largest number of genera and species are found in high-altitude campos of South America, especially in the Brazilian Shield (Minas Gerais and Bahia) and the Guayana Shield in Venezuela. Most species are endemic to restricted localities, often found on only one mountain or tepui summit. However, some species, such as *Leiothrix flavescens*, *Paepalanthus tortilis* (Bong.) Koern., and *Syngonanthus caulescens* (Poiret) Ruhl., occur disjunctly in both Shield areas.

A revision of the genus *Leiothrix* Ruhl., restricted exclusively to South America, is in process, with three new species recently published (Giulietti, 1988). A treatment of the genus for the *Flora of Venezuelan Guayana* is also being prepared by the junior author. *Leiothrix flavescens* is the species with the widest geographic distribution in the genus, including areas of Brazil, Venezuela, Peru, and Guyana. This fact, together with the considerable phenotypic variation, has led to the recognition of several taxa, many of which are here reduced to synonymy, and some of which are retained at the varietal level.

Leiothrix flavescens (Bong.) Ruhl., Pflanzenr. IV.30: 231. 1903. *Eriocaulon flavescens* (Bong.) Mem. Acad. Imp. Sci. St. Pétersbourg, Sér. 6, Sci. Math. 1: 628. 1831. *Paepalanthus flavescens* Koern. in C. Martius, Fl. Bras. 3(1): 423. 1863. *Dupatya flavescens* (Bong.) Kuntze, Revis. Gen. Pl. 2: 745. 1891. TYPE: Brazil. Minas Gerais: Pico Itacolomi, *Riedel 1479* (holotype, LE n.v.; isotypes, K, M, S).

Leiothrix edwallii Silveira, Fl. Serr. Min., p. 70. 1908, syn. nov. TYPE: Brazil. São Paulo: Alto da Serra de Cubatão, Estação de Campo Grande, *Edwall in hb. Silv. 429* (holotype, R).

Leiothrix affinis Silveira, Floral. Mont., vol. I, p. 286. 1928, syn. nov. TYPE: Brazil. Minas Gerais: Baraúna, *Silveira 677* (holotype, R).

Leiothrix tenuifolia Silveira, Floral. Mont., vol. I., p. 285. 1928, syn. nov. TYPE: Brazil. Minas Gerais: Baraúna, *Silveira 675* (holotype, R).

Leiothrix flavescens var. *glabra* Silveira, Floral. Mont., vol. I, p. 291. 1928, syn. nov. TYPE: Brazil. Minas Gerais: Serra do Cipó, *Michaeli in hb. Silv. 712* (holotype, R).

Leiothrix umbratilis Mold., Fieldiana, Bot. 28: 119. 1951, syn. nov. TYPE: Venezuela, Bolívar, between Ptaritepui and Sororopán-tepui, *Steyermark 60280* (holotype, NY; isotype, F).

Leiothrix flavescens var. *parvifolia* Mold., Phytologia 24: 498. 1972, syn. nov. TYPE: Brazil. Minas Gerais: Barão de Cocais, *Irwin et al. 28946* (holotype, NY n.v.; isotype, UB).

Paepalanthus meseticola Mold. & Steyerm., Bol. Soc. Venez. Ci. Nat. 32–33: 281. 1976, syn. nov. TYPE: Venezuela. Bolívar: Cerro Jaua, *Steyermark et al. 109389* (holotype, LL; isotype, MO).

Paepalanthus fraternus var. *marahuacensis* Mold., Phytologia 49: 385. 1981, syn. nov. TYPE: Venezuela. Amazonas: Cerro Marahuaca, *Maguire et al. 65609* (holotype, NY; isotype, MO).

Leiothrix flavescens var. *chimantensis* Mold., Phytologia 54: 66. 1983, syn. nov. TYPE: Venezuela. Bolívar: Chimantá Massif, Apacará-tepui, *Steyermark et al. 128382* (holotype, LL n.v.).

Stem short, or rarely up to 4 cm long. Leaves in rosettes, flat or rarely conduplicate when young, lanceolate, generally slightly falcate, 3.0–26.0 cm long, 0.2–1.5 cm wide, membranaceous, chartaceous to coriaceous, multinerved, usually pubescent on both sides, with filamentous and capitate hairs, glabrescent, rarely with filamentous hairs only, the apex obtuse to rarely acute. Peduncle sheath 3–18 cm long, pubescent with filamentous and capitate hairs, rarely filamentous only or glabrate, the apex truncate and toothed or rarely oblique. Peduncles few to many per plant, cylindrical or rarely flattened, (7.0–)25.0–70.0 cm long, twisted, obscurely 6–10-costate, pubescent with both filamentous and capitate hairs, or rarely with hairs of only one of these types, glabrescent. Capitula hemispherical to globose at maturity, 8.0–12.0 mm diam., the involucral bracts pale yellow-brown to dark red-brown, in 4–5 series, oblong-ovate to lanceolate, acute, the outermost smaller, abaxially pilose, rarely sparsely ciliate to glabrous. Floral bracts oblong-spatulate to lanceolate, acute, abaxially pilose, rarely ciliate or adaxially pilose, equaling or shorter than the flowers.

Staminate and pistillate flowers distributed in approximately concentric rings, or rarely randomly dispersed. *Staminate flowers.* Whole flower 3.0–5.4 mm long, the pedicels 1.0–2.0 mm long. Sepals 3, the two outer carinate, the inner flat, united at the base or the two outer free from each other, rarely the calyx actinomorphic, the apices rounded or truncate, rarely acute, abaxially pilose, rarely sparsely ciliate or with scattered hairs adaxially, the hairs mostly filamentous, a few capitate. Petals 3, united, obtuse, glabrous, equaling or slightly longer than the sepals. Stamens 3, free, exsert or rarely included, the filaments flat, the anthers basifixed. Pistillodes 3, united at the base, clavate. *Pistillate flowers.* Whole flower 4.0–5.4 mm long, the pedicels ca. 0.5–1.5 mm long. Sepals 3, free, carinate, actinomorphic, pubescent as in staminate flowers. Petals 3, free, flat, obtuse to acute, sparsely ciliate to glabrous at apex , equaling or slightly smaller than the sepals. Ring of hairs present at base of gynoecium. Gynoecium with styles and appendages united to the middle or above, usually 3-angled, the appendages ± cylindrical and dilated at the apex, the stigmas simple, exsert to barely included. Seeds elliptical, longitudinally striate.

Phenology: flowers in all areas throughout the year, but peak flowering varies in different localities as follows: Venezuela —January to February; Bahia—July; Minas Gerais—April to May; São Paulo and southward—November to December.

Key to the Varieties of *Leiothrix flavescens*

1a. Involucral bracts and flowers sparingly ciliate to glabrous or with scattered hairs adaxially; peduncles ± flattened; leaves and peduncle sheaths with acute apices ..... *L. flavescens* var. *polystemma*

1b. Involucral bracts and flowers pilose on abaxial surface; peduncles usually cylindrical; leaves usually obtuse, peduncle sheaths truncate at apex.

2a. Young leaves conduplicate ..... *L. flavescens* var. *distichophylla*

2b. Young leaves flat.

3a. Capitula globose; involucral bracts reflexed and hidden at maturity; peduncles about twice the length of the leaves (3.0–7.5 cm long); flowers (including pedicel) longer than 5.0 mm ..... *L. flavescens* var. *alpina*

3b. Capitula hemispherical; involucral bracts not reflexed, evident at maturity; peduncles more than three times the length of the leaves (3.0–25.0 cm long); flowers not longer than 4.0 mm ..... *L. flavescens* var. *flavescens*

Leiothrix flavescens var. **alpina** Mold., Mem. New York Bot. Gard. 9: 279. 1957. TYPE: Venezuela. Bolívar: Auyán-tepui, *Tate 1109* (holotype, NY). Figure 1A, B.

Leiothrix umbratilis var. *brevipes* Mold., Phytologia 33: 24. 1976, syn. nov. TYPE: Venezuela. Bolívar: Auyán-tepui, *Bogner 1017* (holotype, M; isotype, K).

Geographic distribution: Venezuela (Bolívar).

This variety has been collected so far only on Auyán-tepui at about 2,400 m. It is distinguished from var. *flavescens* by the length of the peduncles in relation to the leaves, by the size and random organization of the staminate and pistillate flowers, and by the globose shape of the mature capitula. Two of the three collections seen also had ten or more inflorescences, which is very rare in var. *flavescens* in Venezuela. In Venezuela and in southern and southeastern Brazil, var. *flavescens* usually has no more than five inflorescences per plant, although in Bahia and Minas Gerais, the number may be higher.

Additional specimens examined. VENEZUELA. BOLÍVAR: Auyán-tepui, *Huber 8567* (LL, NY), *Cardona 41503* (VEN).

Leiothrix flavescens var. **distichophylla** (Silveira) Giulietti & Hensold, comb. et stat. nov. *Leiothrix distichophylla* Silveira, Floral Mont., vol. I, 287. 1928. TYPE: Brazil. Minas Gerais: Diamantina, Quartel, *Silveira 412* (holotype, R). Figure 1C–E.

Geographic distribution: Brazil (Minas Gerais).

This variety has been collected only in sandy wet campos of Diamantina and Grão Mogol, where it may occur in close association with var. *flavescens.* With this variety, it shares a cespitose habit, a similar organization of flowers in the capitulum, and similar floral structure. However, it may be immediately distinguished from var. *flavescens* by the young leaves conduplicate and in a distichous ar-

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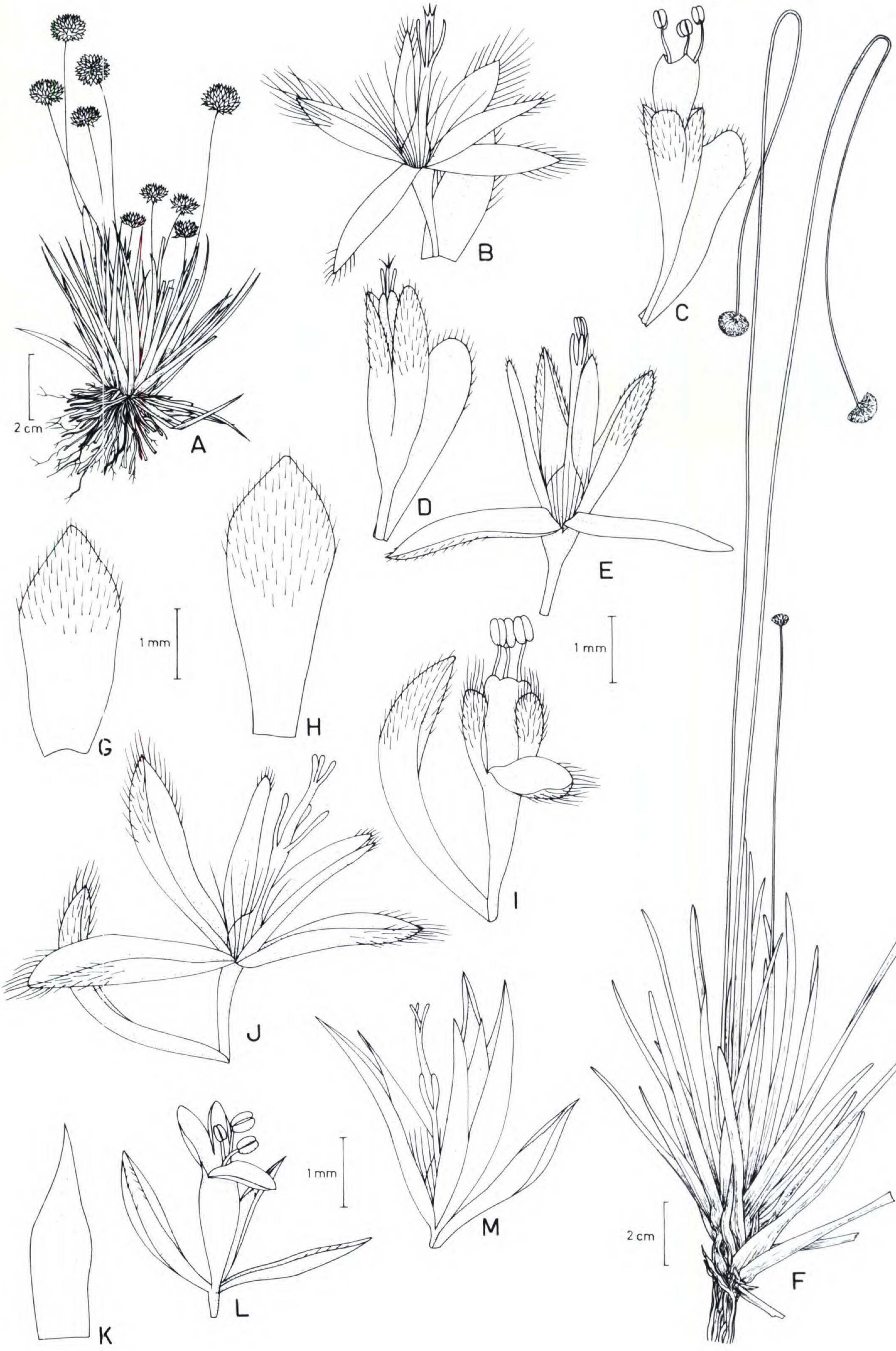
Figure 1. *Leiothrix flavescens* (Bong.) Ruhl. and varieties. A, B. *L. flavescens* var. *alpina* Mold. (*Bogner 1017*, K).—A. Habit. —B. Pistillate flower. C–E. *L. flavescens* var. *distichophylla* (Silveira) Giulietti & Hensold (*Silveira 412*, R). —C. Staminate flower.—D, E. Pistillate flower. F–J. *L. flavescens* var. *flavescens* (F, *Riedel 1479* at K; G–J. *Giulietti et al. in CFCR 4900* at SPF). —F. Habit. —G, H. Involucral bracts, abaxial view. —I. Staminate flower. —J. Pistillate flower. K–M. *L. flavescens* var. *polystemma* (Silveira) Giulietti & Hensold (*Silveira 637*, R). —K. Involucral bract, abaxial view. —L. Staminate flower. —M. Pistillate flower.


2 cm
A
B
C
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1 mm
1 mm
G
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2 cm
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1 mm
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rangement. This character is also found in the closely related species *L. hirsuta* (Wikström) Ruhl. and in *L. distichoclada* Herzog.

Additional specimens examined. BRAZIL. MINAS GERAIS: Grão Mogol, Serra do Pipiri, *Hatschbach 42869* (MBM, MO, SPF); Grão Mogol, near town, *Hensold et al. Coleção Flora dos Campos Rupestres* (i.e., *CFCR*) *3500* (MICH, SPF); Diamantina, estrada para Biri-Biri, *Hensold et al. CFCR 3171* (MICH, SPF); São João da Chapada, 14 km from Diamantina, *Hensold et al. CFCR 3868* (MICH, SPF); entre Serro e Datas, *Ferreira 7252* (PAMG).

Leiothrix flavescens (Bong.) Ruhl. var. *flavescens.* Figure 1F–J.

Common names (Brazil): Capim manso, Capipoatinga-amarela, Gravata-manso, Sempre-viva-do-campo (Moldenke & Smith, 1976), and *Botão-bolinha* (Diamantina, Minas Gerais).

Economic importance: In Diamantina, Minas Gerais, this variety is collected and sold as one of the "sempre-vivas" of the region. In 1984, 4,000 kg of peduncles and heads were exported for use as home decoration (Giulietti et al., 1988).

Geographic distribution: Venezuela (Amazonas, Bolívar); Guyana (vicinity of Roraima and Serra Pakaraima); Peru (Amazonas, Pasco); Brazil (Bahia, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul). Moldenke & Smith (1976) reported this species from Goiás, but we were unable to confirm it there.

Leiothrix flavescens var. *flavescens* occurs throughout the distribution of the species. In Venezuela and Guyana, it is limited to the Guayana Shield area, where it is found in sandy wet meadows and on sandstone outcrops at 1,100–2,800 m. It is common on summits of all tepui formations in the state of Bolívar and also widespread though more sporadic to the west in Amazonas.

Noteworthy variants are found at the Cerro Marahuaca in Amazonas, and at the summit of the Chimantá Massif in Bolívar. The plants at Cerro Marahuaca, described as *Paepalanthus fraternus* var. *marahuacensis*, are distinguished by coriaceous leaves and firm involucres, which are often deep brown, glabrous, and remain firmly enclosing the head even at maturity. Peduncle lengths also tend to be irregular in this population. The Chimantá population includes the smallest known representatives of the species, some with leaves no more than 3 cm long and only 1–2 mm wide, and heads only 7–8 mm diam. These plants are described as *Leiothrix flavescens* var. *chimantensis.* However, leaf size and capitulum size are not completely correlated, and these small forms grade continuously into forms of typical size at the same locality.

In Peru the variety is known from only two collections at ca. 1,500–2,000 m. In spite of the large distance from other centers of distribution, the Peruvian material is very similar to material from Brazil and Venezuela.

In Brazil, the variety has a large geographic distribution, from Bahia to Rio Grande do Sul, where it occurs mostly in wet sandy areas in high-altitude campos at 1,000–1,800 m. In Santa Catarina and Rio Grande do Sul, it also occurs in coastal restinga, and a single collection is known from the restinga of Bahia.

The variety is most abundant, ubiquitous, and apparently competitive in the Cadeia do Espinhaço in Bahia and northern Minas Gerais. The most robust forms occur here, as well as the largest populations. In the Chapada do Couto in Minas Gerais the largest population known was observed, occupying an area of more than 6.0 m diam. Farther south in Minas Gerais, as in the Serra do Cipó and the Serra de Ibitipoca, the populations are scattered and smaller, similar to those of the Serras do Mar and Mantiqueira in Rio de Janeiro and São Paulo, and the reduction in size and frequency of the populations continues southward to the Serra Geral of Paraná and Santa Catarina, and the coastal restinga of Santa Catarina and Rio Grande do Sul. The majority of the collections examined from the Serra de Ibitipoca southward are composed of smaller individuals with a relatively dark brownish pubescence of the heads and leaves, and sometimes with leaves coriaceous, suggesting similarity with the population of Cerro Marahuaca, Venezuela.

Although it is a well-defined taxon, local differentiation between populations has led to the description of a number of superfluous taxa. *Leiothrix flavescens* var. *parvifolia* Mold. is distinguished only by smaller leaf size, a character that is very variable throughout the species. *Leiothrix flavescens* var. *glabra* Silveira is distinguished by glabrescent leaves, which, however, are pilose when young. This same pattern of variation in pubescence is observed in specimens of various localities, especially in Bahia. *Leiothrix tenuifolia* and *L. affinis* differ in no way from typical *L. flavescens. Leiothrix edwallii* Silveira is based upon a juvenile plant with small leaves and peduncles, similar to the majority of plants found in southern and southeastern Brazil.

Representative specimens examined. VENEZUELA. AMAZONAS: Cerro Yaví, *Huber 11906* (MO); Cerro Marahuaca, *Maguire et al. 65609* (MO, NY, VEN); Cerro de la Neblina, *Steyermark & Luteyn 129821* (LL, VEN). BOLÍVAR: Serranía Guanay, *Huber 11015* (MO); Cerro Jaua, *Steyermark et al. 109389* (MO); Cerro Guaiquinima, *Steyermark et al. 117345* (VEN); Cerro El Sol, NE of Auyán-tepui, *Huber 12122* (MO); Auyán-tepui, *Holst*

3804 (MO); Chimantá Massif, Apácara-tepui, *Huber & Colella 8738* (LL, VEN); Chimantá Massif, Apácara-tepui, *Huber et al. 8902* (NY); Cavanayén, *Ferrari 1080* (MY); Ptari-tepui, *Holst 3583* (MO); Ilú-tepui, *Huber 9492* (MO); Mount Roraima, *Steyermark et al. 112437* (NY, VEN). GUYANA: Mount Roraima, *Jenman 60* (US); Sierra Pakaraima, *Maguire & Fanshawe 32537* (US). PERU. AMAZONAS: Chachapoyas, *Wurdack 583* (US). PASCO: Oxapampa, *Vera 1567* (US). BRAZIL. BAHIA: Valença, *Carvalho 834* (CEPEC); Barra da Estiva, Morro do Ouro, *Giulietti et al. CFCR 1258* (K, SPF); Serra de Itubira, *Luetzelburg 276* (M, NY, R); Rio de Contas, Pico das Almas, *Harley et al. 19586* (CEPEC, IPA, K, NY, SP, SPF, UEC, US): Mucugê, estrada para Cascavel, *Harley et al. 18837* (CEPEC, IPA, K, NY, SP, SPF, UEC, US). MINAS GERAIS: *Martius 882* (K, M), *Claussen s.n.* (K, S); Grão Mogol, margem do Rio Itacambiruçu, *Hatschbach 41333* (MBM, NY, UEC); Joaquim Felício, Serra do Cabral, *Irwin et al. 27113* (F, K, MO, NY, UB, US); Milho Verde, estrada para Serro, *Hensold et al. CFCR 3740* (MICH, SPF); Santana do Riacho, Serra do Cipó, km 118, *Giulietti, Coleção Flora da Serra do Cipó* (i.e., *CFSC*) *4617* (SP, SPF); Ouro Preto, *Martius s.n.* (M); Estrada Lavras–São João del Rey, *Hensold et al. CFCR 2721* (MICH, SPF); Juiz de Fora, Serra de Ibitipoca, *Krieger & Camara 9372* (UFJF). RIO DE JANEIRO: Rio de Janeiro, Gavea, *Luetzelburg 15505* (M); Serra dos Orgãos, *Gardner 704* (BM, S, US). SÃO PAULO: São Paulo, Ipiranga, *Brade 5528* (SP, S); alto da Serra da Paranapiacaba, *Moldenke & Moldenke 19639* (S). PARANÁ: Curitiba, Higienópolis, *Hatschbach 28553* (MBM); Ponta Grossa, *Dusen 2714* (F, S). SANTA CATARINA: Palmeira, rodovia do café, *Reitz & Klein 17467* (HBR, NY, US). RIO GRANDE DO SUL: Osório, Fazenda Arroio, *Rambo 45183* (UFRS).

Leiothrix flavescens var. **polystemma** (Silveira) Giulietti & Hensold, comb. nov. *Leiothrix polystemma* Silveira, Floral. Mont., vol. I, p. 293. 1928. TYPE: Brazil. Minas Gerais: Baraúna, *Silveira 637* (holotype, R). Figure 1K–M.

Leiothrix polystemma var. *robusta* Silveira, Floral. Mont., vol. I, p. 294. 1928, syn. nov. TYPE: Brazil. Paraná: Margens secas do rio Piraí, *Michaeli s.n.* (holotype, R).

Geographic distribution: Brazil (Minas Gerais, Paraná).

This variety is similar to var. *flavescens* with respect to habit and concentric organization of the staminate and pistillate flowers in the capitulum. It is characterized by the glabrescent leaves, which lack capitate hairs, by the acute apices of the leaves and peduncle sheaths, and especially by the involucral bracts sparingly ciliate to glabrous, and by the floral bracts and sepals with scattered cilia and sometimes with scattered hairs on the adaxial surface, but never pilose abaxially as in var. *flavescens*.

Additional specimen examined. BRAZIL. MINAS GERAIS: Diamantina, *Giulietti 959* (SPF).

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